Appendix A
The Commonwealth of Massachusetts
Executive Office of Health and Human Services
Department of Public Health
Center for Environmental Health
Bureau of Environmental Health Assessment
250 Washington Street, Boston, MA 02108-4619

March 1, 2005

Robert Deane
Buckland Town Offices
17 State Street
Shelburne Falls, MA 01370

Dear Mr. Deane:

As you know, the Massachusetts Department of Public Health (MDPH), Bureau of Environmental Health Assessment (BEHA) conducted an indoor air quality assessment at the Buckland Town Offices (BTO), 17 State Street, Village of Shelburne Falls, Buckland, Massachusetts. The BTO were recently renovated. Renovations included the addition of an elevator and the installation of a heating, ventilating and air-conditioning (HVAC) system and furnace (Picture 1). On January 6, 2004, a visit to conduct an assessment was made to this building by Michael Feeney, Director, of the Emergency Response/Indoor Air Quality (ER/IAQ) Program. This assessment was prompted by reports of odors in the administrator's office area. Please note, this particular area is located directly above the newly installed basement furnace. No reports of furnace odor were made by any occupants of other offices in the BTO.

BEHA staff noted a furnace-like odor upon entering the administrator's office and, similarly, upon entering the basement. As discussed, a new furnace was installed in the basement area. This new furnace combusts oil to fuel the equipment. The process of combustion produces airborne liquids, solids and gases, including carbon monoxide (CO) and carbon dioxide (NFPA, 1997). Of these materials, CO and smoke can produce immediate, acute health effects upon exposure.

CO is a by-product of incomplete combustion of organic matter (e.g., gasoline, wood and tobacco). Several air quality standards have been established to address carbon monoxide pollution and prevent symptoms from exposure to these substances. The MDPH established a corrective action level concerning carbon monoxide in ice skating rinks that use fossil-fueled ice resurfacing equipment. If an operator of an indoor ice rink

measures a carbon monoxide level over 30 ppm, taken 20 minutes after resurfacing within a rink, that operator must take actions to reduce carbon monoxide levels (MDPH, 1997).

The US Environmental Protection Agency has established National Ambient Air Quality Standards (NAAQS) for exposure to carbon monoxide in outdoor air. The American Society of Heating Refrigeration and Air-Conditioning Engineers (ASHRAE) has adopted the NAAQS as one set of criteria for assessing indoor air quality and monitoring of fresh air introduced by HVAC systems (ASHRAE, 1989). According to the NAAQS, carbon monoxide levels in outdoor air must be maintained below 9 ppm over a twenty-four hour period in order to meet this standard (US EPA, 2000). *Carbon monoxide should not be present in a typical, indoor environment.* If it *is* present, indoor carbon monoxide levels should be less than or equal to outdoor levels.

BEHA staff examined the furnace and conducted air sampling for carbon monoxide and carbon dioxide. The measurement of CO and/or carbon dioxide in close proximity to equipment that combusts fuel can indicate exhaust leaks. BEHA staff measured CO measurements of 5 parts per million (ppm) near hole through which a pipe penetrates the interior of the furnace cabinet (Picture 2). A carbon dioxide measurement of 6,000 ppm was measured in this same area (Picture 3). The Occupational Safety and Health Adminstration's (OSHA) Permissble Exposure Limit (PEL) is 5000 ppm. These measurements clearly indicate that when the furnace is activated, products of combustion are venting into the basement, rather than out the building via the chimney. In its current condition, the furnace appears to be releasing combustion products upwards. Such products then pass into the administrator's office through seams and other breaches in the floor. In addition to CO and carbon dioxide, water vapor and particulate (e.g., smoke) are produced during combustion. As previously discussed, particulate matter (e.g. smoke) is also of concern. Smoke is an irritant to the eyes, nose throat and respiratory system.

While CO levels were below the NAAQS, the high carbon dioxide levels indicate serious insufficiencies with regard to ventilation at the time of this assessment. The venting of smoke into the building is likely the source of furnace odors in the administrator's office. Smoke can also be attributed to irritant symptoms experienced by the occupant. Based on the observations made during this assessment, BEHA makes the following recommendations:

1. Ensure that an adequate supply of combustion air exists for the boiler and other fossil fuel using equipment. Consult with the Fire Safety Office of the Buckland Fire Department.

2. Examine and repair the furnace casing to prevent furnace exhaust leakage.

3. Ensure that the chimney is not blocked.

4. Obtain a digital readout carbon monoxide detector for the hallway immediately outside the boiler room.

Please feel free to contact us at (617) 624-5757 if you have any questions or need further information, prior to the MDPH's issuance of a full report.

Sincerely,

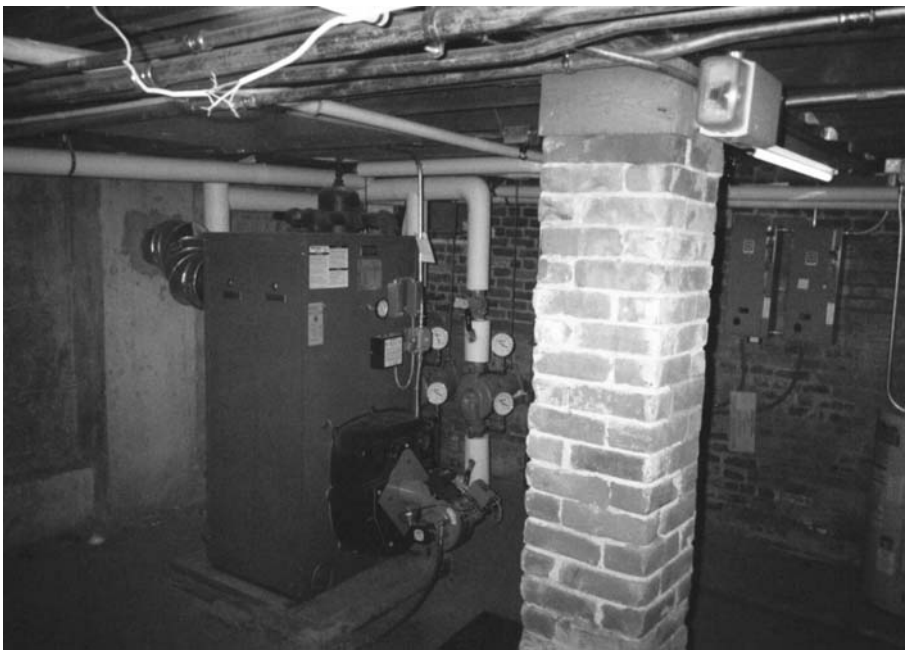
Michael A. Feeney, R.Ph., J.D., C.H.O., Director
Emergency Response/Indoor Air Quality Program

cc/ Suzanne K. Condon, Associate Commissioner, Center for Environmental Health

Methods

Air tests for carbon monoxide were taken with the TSI, Q-Trak ™, IAQ Monitor Model 8550/8551. Air tests for ultrafine particulates were taken with the TSI, P-Trak ™ Ultrafine Particle Counter Model 8525.

Picture 1



Furnace in Basement of BTO

Picture 2

CO Measurement above Furnace

Picture 3

Carbon Dioxide Measurement above Furnace